CMP-10
SERVICE MANUAL

PRODUCT NAME: **CMP-10**
TERRITORY: **TD**
REVISION: **1.0**
DATE: **2002.07.25**

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INTRODUCTION

This manual describes the disassembly, reassembly, and maintenance procedures of Citizen Mobile Printer CMP-10. It is intended for field maintenance men.

1. FEATURES

This small, portable line thermal printer is designed for various types of Personal Data Assistance (PDAs) devices, notebook computers, mobile phones etc. Its abundant built-in features allow you to widely use this printer for different applications.

Prior to using it, read and understand this manual thoroughly.

(1) Small, lightweight, you can carry it everywhere
(2) High speed and low noise, owing to line thermal print
(3) Long-life printing head and high reliability, owing to the simple mechanism
(4) Easy paper-loading, owing to clamshell mechanism
(5) Built-in input buffer - 64 K
(6) Capable of printing a bar code (Special command)
(7) Capable of IrDA communication
(8) Capable of using magstripe reader
(9) Interfaces to Pocket PC and PALM OS devices

2. GENERAL SPECIFICATIONS

Feature	Parameters
1. Printing system	Direct thermal printing
2. Printing speed	50 mm/sec
3. Printing head	Total dots: 384 Dot density: 8 dots/mm Printing width: 48 mm
4. Emulation	ESC/POS commands + Unique commands (with some unique functions)
5. Characters	ASCII Code, Alphanumeric characters, International characters, Windows Code page
6. Characters per line	FONT A: 32 characters/line, FONT B: 42 characters/line
7. Dot matrix	FONT A: 12H × 24V, FONT B: 19H × 16V
8. Bar code type	UPC-A/E, JAN(EAN)13/8 columns, ITF, CODE39, CODE128, CODABAR
9. Paper feed system	Friction feed
10. Paper width	58 ±0.5 mm
11. Paper thickness	60 - 65 µm
12. Recommended paper	TF50-KS-E2D (Nippon Paper)
13. Paper roll maximum diameter	40 mm (CMP-10-40), 50 mm (CMP-10-50)
14. Minimum core diameter	8 mm
15. Interfaces	IrDA version 1.0 Serial interface (by special cable - option)
16. IrDA Interface	Mode: Infrared transceiver mode Transport wave: Wave length - 850 to 900 nm Communication speed: 9600, 19200, 38400, 57600, 115200 bps Data length: 8 bits Start bit: 1 bit Stop bit: 1 bit Parity: none Communication: Half duplex Flow control: IrDA standard Communication distance: Max. 80 cm
17. Serial interface	Speed: 1200, 2400, 4800, 9600, 19200, 57600, 115200 bps Interface: Bidirectional serial communication Signal level: RS-232C Data lenght: 8 bits Start bit: 1 bit Stop bit: 1 bit Parity: None Flow control: Xon/Xoff only Connector: Motorola Star Tac
18. Input buffer	64 KB
19. Mag stripe reader	Track 1, 2, 3
20. LED color	Power LED: GREEN and RED Charge LED: GREEN and RED

Feature	Parameters
21. Operation switches	Power switch 1, LF switch 1
22. Sensors and error monitoring	Paper end sensor, Open cover sensor, Head temperature, Low battery
23. Power consumption	Idle - approximately 2W When printing - approximately 15W
24. Battery	Battery type: Li-ion battery pack Cell Voltage: 3.7 V Number of cells: 2 Battery pack voltage: 7.4 V Battery pack capacity: 2000 mAh
25. Battery charging time	Approximately 3 hours by main unit + AC adapter
26. Maximum lines printed with fully charged battery	40,000 lines (At temperature 20°C, standard setting, alphanumeric slide pattern printing. The number of lines may be changed by such condition as temperature, etc.)
27. Power supply monitoring	Auto Power OFF (programmable - from 1 to 60 sec.) Low battery monitoring included.
28. AC Adapter	Model: 10AD-JU (for Japan, USA, and Canada) 10AD-E (Europe) Input voltage 90 V - 264 V AC Output voltage 9.0 V DC 1.0 A
29. Operating Environment	Temperature: 5 – 40°C Humidity: 35 – 80% RH (No dew condensation)
30. Storage Environment	Temperature: –20 – 60°C Humidity: 10 – 90% RH (No dew condensation)
31. Reliability	Print head: 50,000,000 pulses or 50km (Normal temperature, 12.5% density, rated energy) Mechanism: 15,000,000 lines
32. Safety standard and EMI	UL, C-UL, TUV, GS, CE Marking FCC Class B, VCCI Class B
33.Dimensions	116 (W) × 104 (D) × 63 (H) mm (50 mm paper cover + Mag stripe reader)
34. Weight	Approx. 370 g (with battery and belt clip without paper)
35. Options	Serial Cable, Mag Stripe card reader (Factory option)

3. DISASSEMBLY AND REASSEMBLY

In case of maintenance work, observe the following:

CAUTION

(1) If the printer functions properly, do not disassemble, reassemble, or adjust it. Particularly, do not loosen each set screw unless required.

(2) After inspecting the printer, be sure to confirm that it is free from error.

(3) Never try to print without setting the printing paper in the printer. Confirm that it is properly set.

(4) In case of maintenance work, be careful not to leave the used parts or screws in the printer.

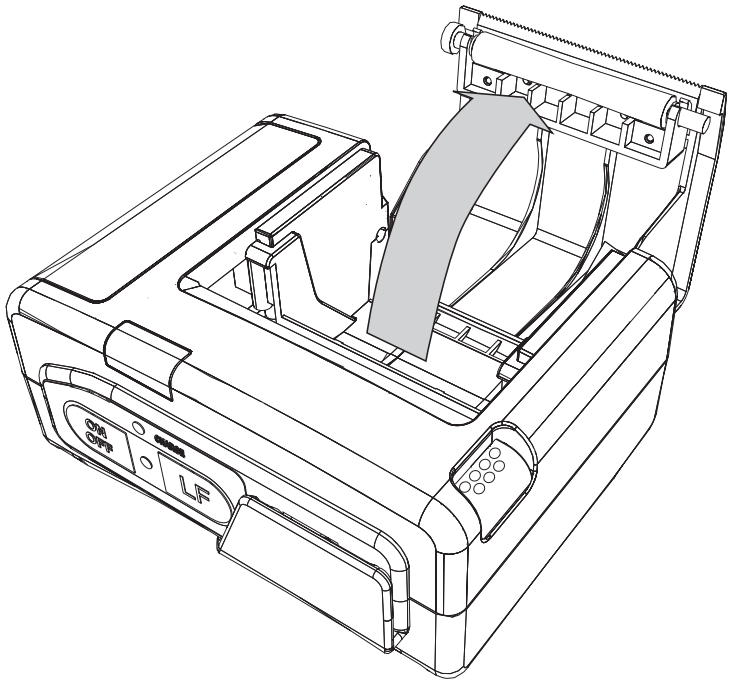
(5) When handling the thermal head or control board, do not wear the gloves which will easily cause static electricity. Prior to handling it, discharge static electricity from your body. Also, never conduct maintenance work in a place where the printer will be easily electrified.

(6) When disassembling and reassembling, check the cords and boards for any damage, and do not cable or fix them in an inappropriate manner by force.

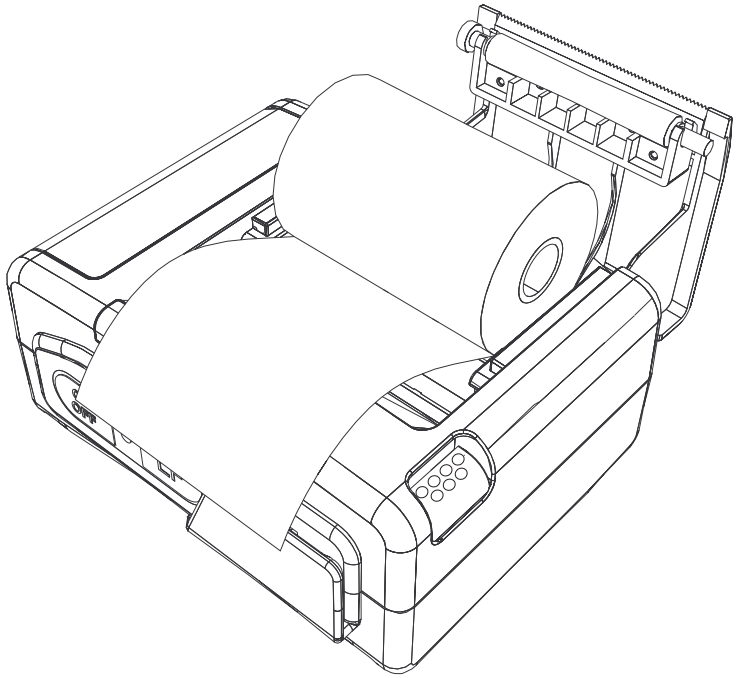
(7) Never carry out maintenance work with the power turned on.

3.1 Disassembly Procedure

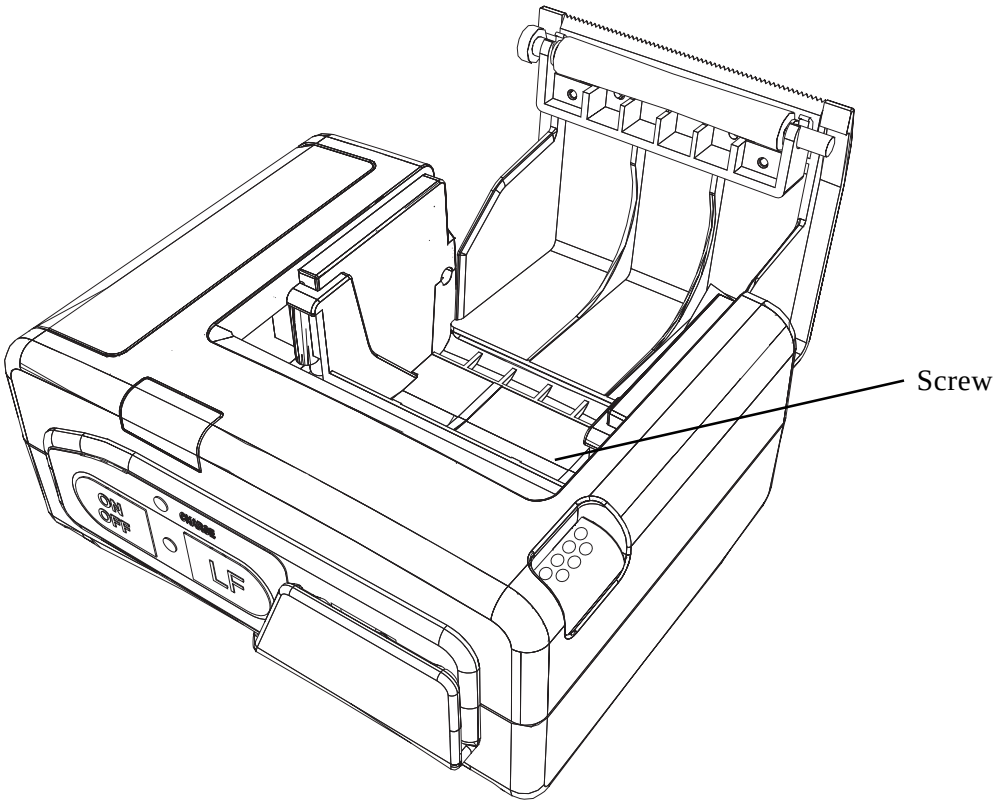
1. Prior to Disassembly
   (1) Disconnect all the cables from the the main body. For your safety, unplug a power cord from a plug socket.
   (2) Open the paper cover.



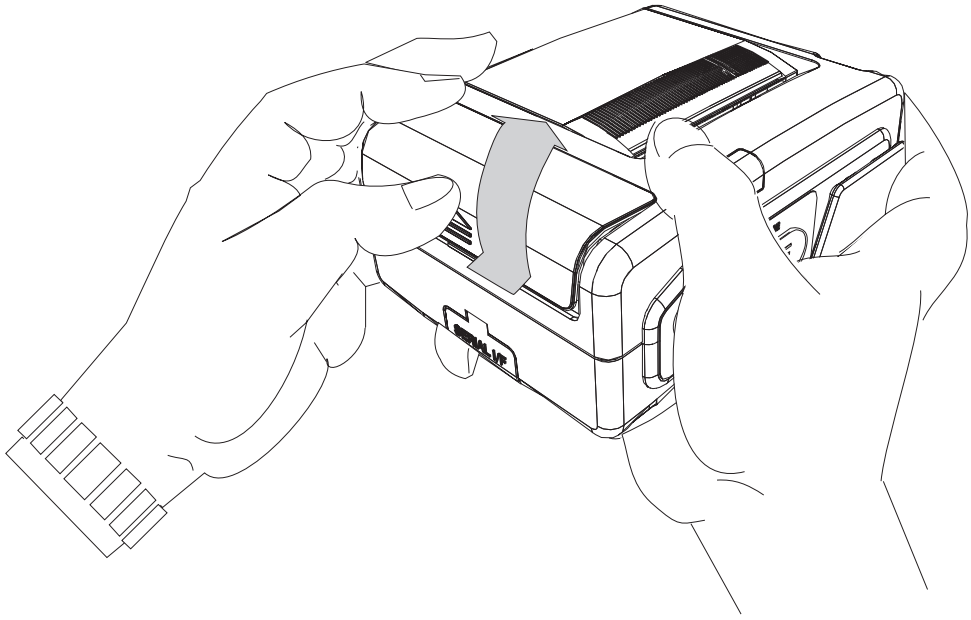
(3) Remove the paper roll from the paper magazine.



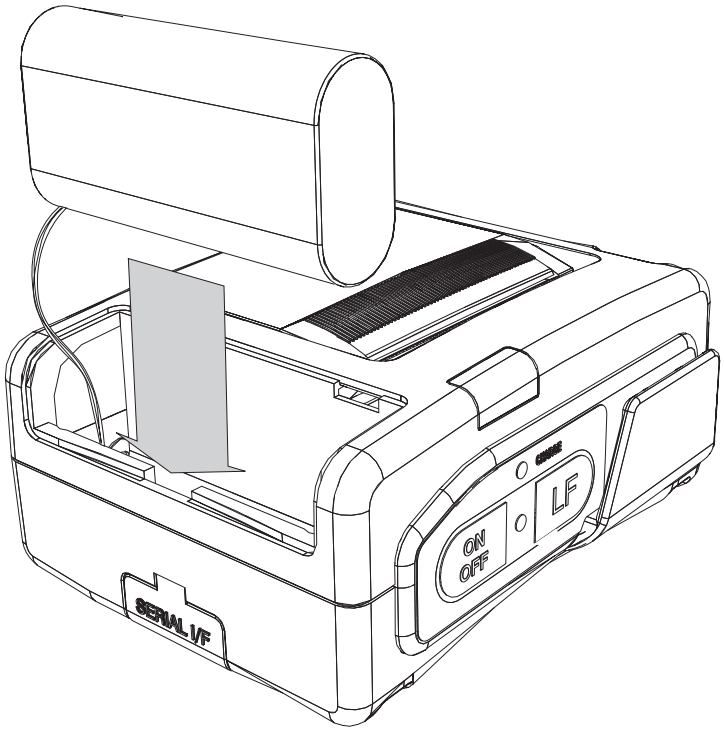
(4) Unscrew the screw on the bottom of the paper magazine.
(5) Close the paper cover.



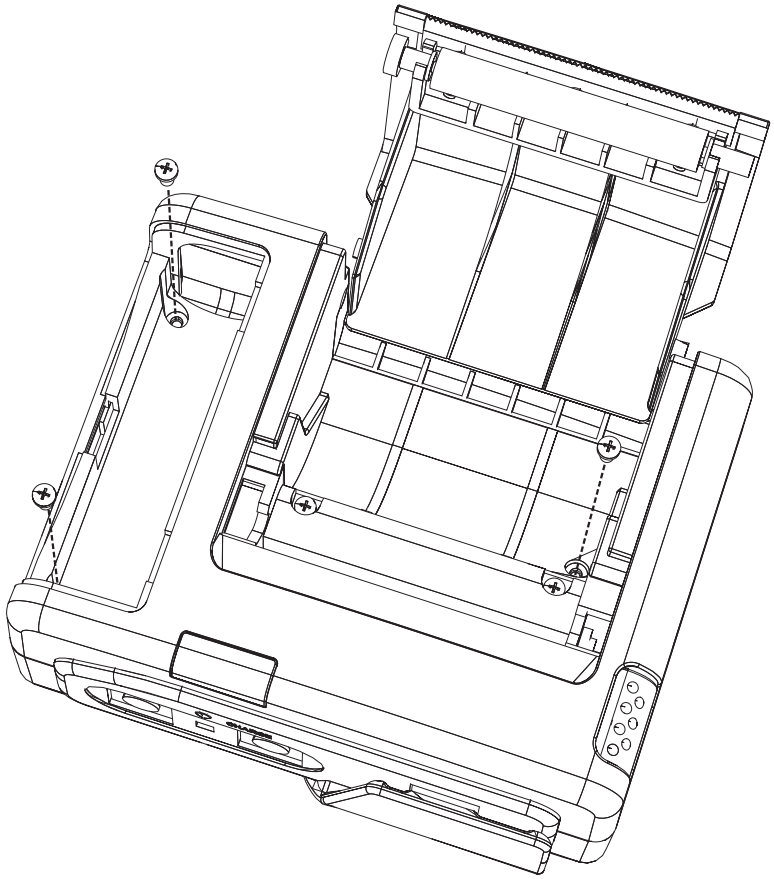
2. Removing the battery cover
   (1) Press the marked area on the battery cover and lift the cover.



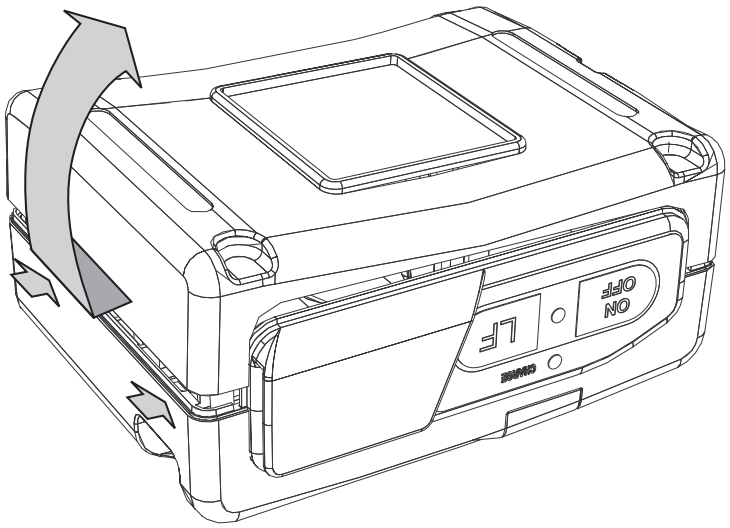
3. Removing the battery
   (1) Open the battery cover as shown above.
   (2) Take out the battery pack.
   (3) Disconnect the battery pack from the connector.
   (4) Remove the battery pack from the battery compartment.



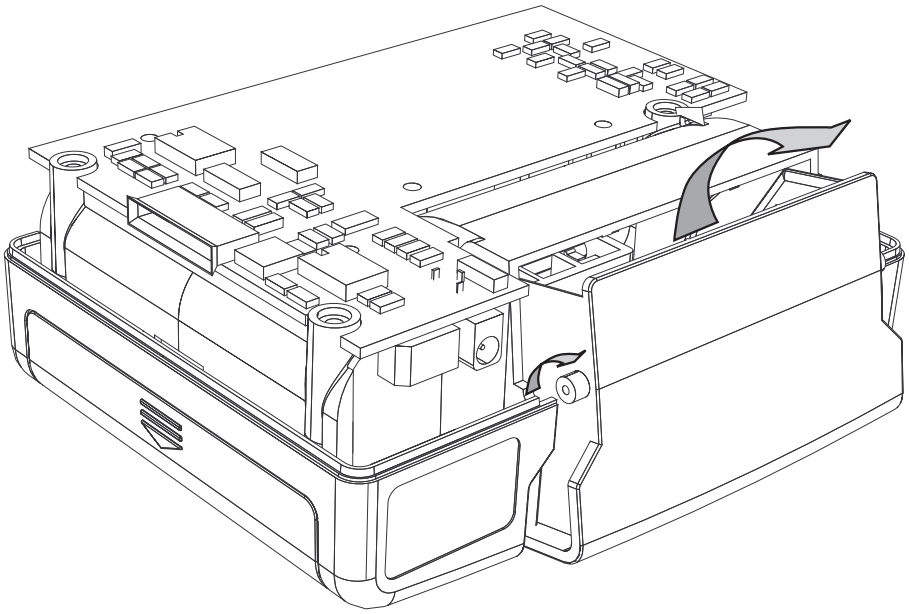
(5) Remove two M3 × 10 (BT) screws.



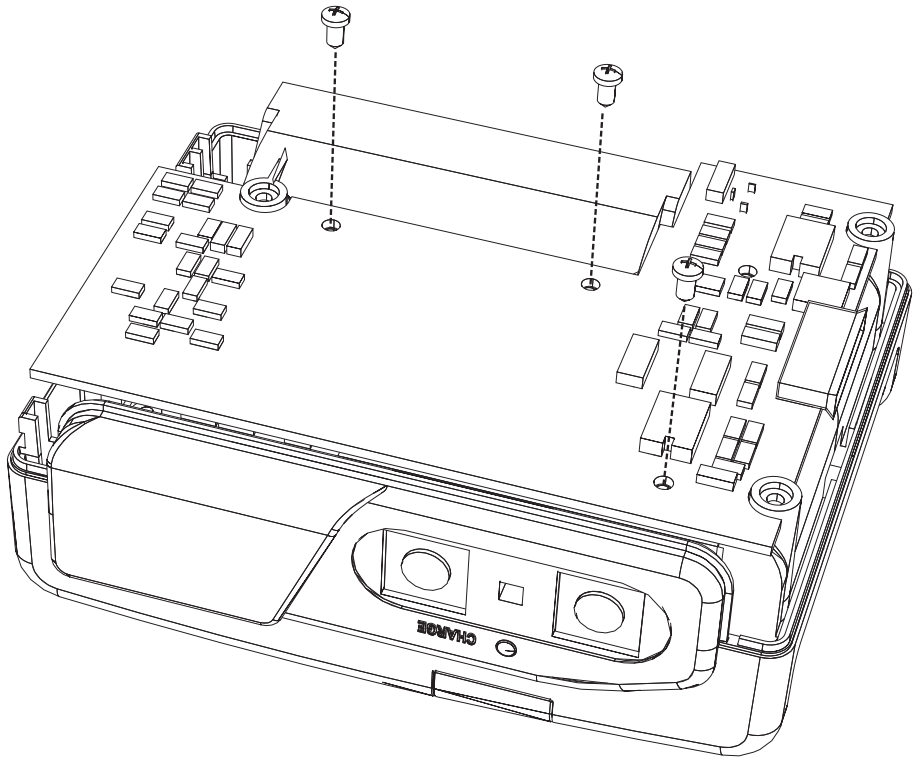
4. Removing the back cover
   (1) Turn the printer downward.
   (2) Push the front cover at the places shown on the drawing and lift the back cover.
   (3) Remove the back cover.



5. Removing the paper cover
   (1) Lift the printer.
   (2) Take out the paper cover as shown on the drawing.

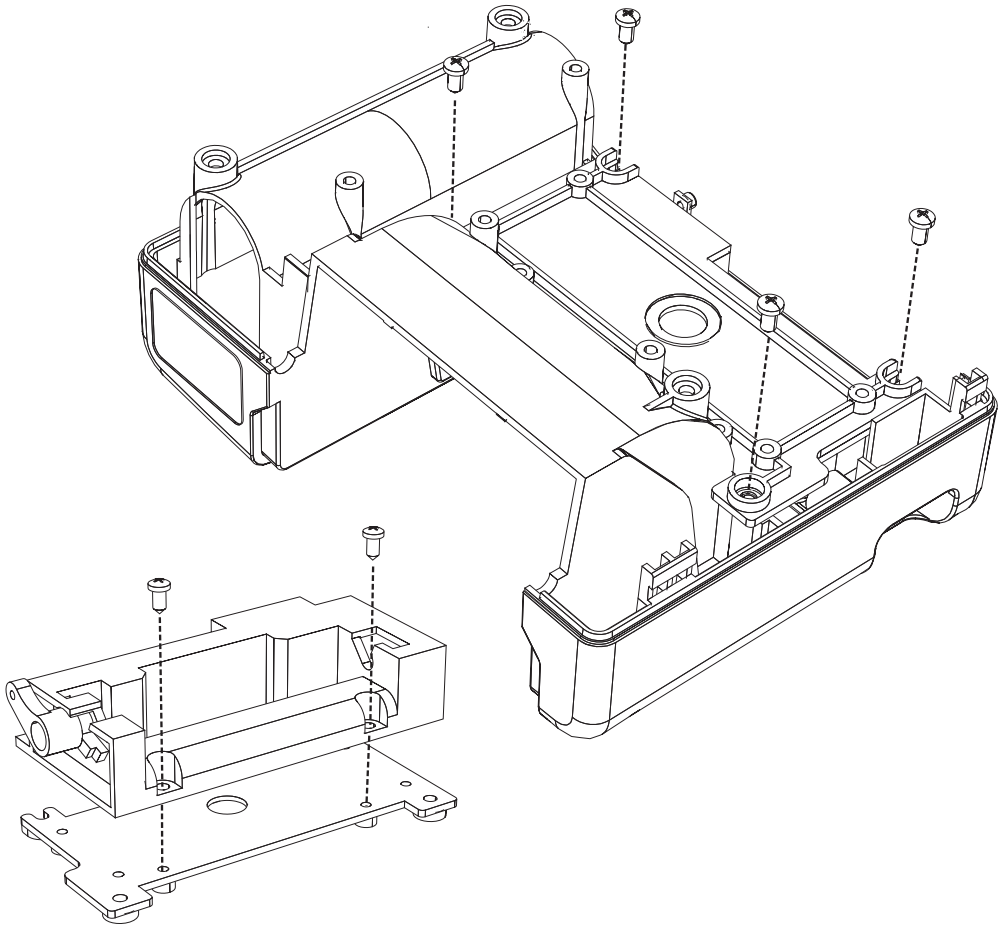


6. Removing the Main PCB and Operational Panel
   (1) Unscrew the three screws with which the Main PCB is fixed to the plastic case as shown on the drawing.

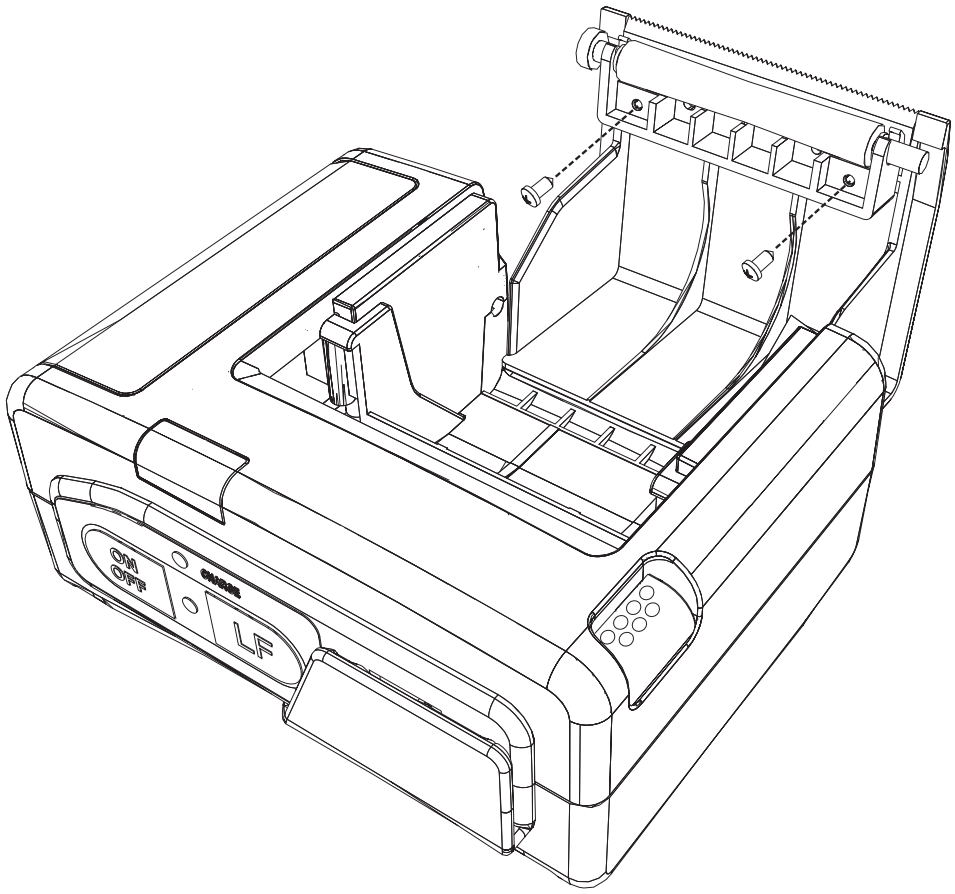


(2) Lift up the Main PCB together with the operational panel.
(3) Disconnect the printer cables and Buzzer cable.
(4) Remove the Main PCB and the operational panel.
(5) Disconnect the Operational panel from the Main PCB.

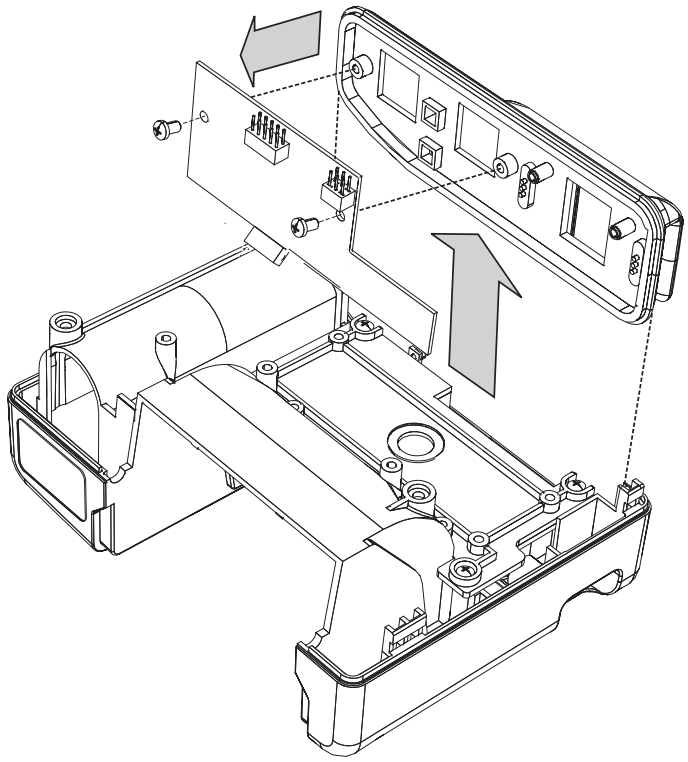
7. Removing the printer
(1) Unscrew the four screws which are fixing the printer to the plastic case.
(2) Remove the module from the plastic case.
(3) Unscrew the two screws which fix the printer to the plastic carrier.
(4) Pull the printer forward and detach it from the plastic carrier.



8. Removing the platen (for model CMP-10-40)
   (1) Unscrew the screws as shown on the drawing.
   (2) Detach the platen.



9. Removing the Operational Panel PCB
   (1) Unscrew the two screws and detach the Operational Panel PCB from the plastic panel.



3.2 Reassembly Procedure

Reassemble the disassembled parts in the reverse order of the disassembly procedure described in 3.

CAUTION:

1. Route the cables very carefully so that they will not be caught.
   - The flat cable should be located on the board side.
2. Tighten the screws firmly, but avoid tightening them too hard.
3. Use only the attached screws. There are several kinds of screws used. If they are unscrewed, be sure to put them back in their original places.
4. After reassembly, be sure to check prior to turning on the power.

4. TROUBLESHOOTING

4.1 Troubleshooting Procedure

If the printer has a trouble, confirm its phenomenon, determine a defective part according to 4.2 Troubleshooting Guide, and then, repair it in the specified manner.

- Phenomenon

  Find a corresponding trouble phenomenon in this column. If there multiple corresponding phenomena, confirm taking all of them into account.

  This allows you to determine a hidden defective part.
- Cause

  Possible causes are listed as many as possible in this column. Project a trouble cause and determine it by the check method described in the next column.
- Check Method

  Check methods are listed in this column to determine the relevant trouble cause.
- Repair Method

  Repair the defective part in the manner described in this column.

Efficient troubleshooting is enabled without making a erroneous judgment by repairing in the above-mentioned procedure.

4.2 Troubleshooting Guide

The following table lists the check methods and repair methods based on possible phenomena and causes.

AC Adapter Failure

Phenomenon	Cause	Check Method	Repair Method
Charging LED is not shining though DC adapter is connected.	The AC cord is not connected to Power inlet.	—	Connect the AC cord to the specified plug socket, etc.
	The voltage is abnormal. (It is slightly higher than the rating in the no-load state)	Use a voltmeter to measure a supply voltage.	Replace the AC adapter.
	The AC adapter was connected to another device in the past.	—	Replace the AC adapter.

Power Supply Failure

Phenomenon	Cause	Check Method	Repair Method
The power cannot be turned on. (POWER lamp not illuminated)	The AC adapter is not connected.	—	Connect the specified AC adapter.
	Battery pack is not connected.	Check if the battery pack is connected.	Connect proper battery pack.
	Battery pack is discharged.	Connect the AC adapter and check that the charge LED is blinking.	Charge the battery pack.
	The fuse is gone.	Check whether or not the non-specified power supply was used in the past.	Use the specified AC adapter.
		Check whether or not the specified fuse is used.	Use the specified fuse.
	Others	Check whether or not the specified power supply is used.	Use the specified AC adapter.
		Check whether or not the operation panel board is connected.	Replace the cable of the operation panel board. Connect the connector.
The fuse blows out immediately if replaced. It blows out during operation. (F2 blows out)	The printer mechanism or control board is defective.	The power is turned on by disconnecting the cable of the printer mechanism. (Does not operate)	Replace the printer mechanism.
		The phenomenon remains unchanged after the above-mentioned check.	Replace the control board.
	The motor or driver of the printer mechanism is defective.	The power is turned on by disconnecting the motor cable. (Does not operate)	Replace the printer mechanism.
		The phenomenon remains unchanged after the above-mentioned check.	Replace the motor driver or control board.

Phenomenon	Cause	Check Method	Repair Method
No printing	Faulty battery pack	Check whether or not the specified Battery pack is used.	Use the specified Battery pack.
	Battery pack is discharged.	Connect the AC adapter and check that the charge LED is shining.	Charge the battery pack.
	Faulty mounting and connection of printer mechanism	Check mounting and connection of the printer mechanism.	Mount the printer mechanism properly.
	The printer operates properly except not printing	Check whether or not the specified paper is used, and whether or not the specified paper is set inside.	Set the specified paper properly.
	Faulty printer mechanism	—	Replace the printer mechanism.
	The head is heated due to continuous print, etc.	Wait for some time.	Reset automatically.
Thin printing color	Faulty battery pack	Check whether or not the specified battery pack is used.	Use specified battery pack.
	Battery pack is discharged	Connect the AC adapter and check that the charge LED is blinking.	Charge the battery pack.
	Non-recommended paper	Set print density higher with the proper command.	Replace with the recommended paper or its equivalent.
	Faulty thermal head	—	Replace the thermal head.
Missing dots	Faulty printer mechanism connection	Check whether or not the printer mechanism cable is connected properly.	Connect the printer mechanism cable properly.
	Foreign substance adhered to the thermal head or platen roller	Check the thermal head and platen roller for any foreign substance.	Dip a cotton swab or soft cloth in ethyl alcohol and wipe off the foreign substance.
	Faulty thermal head	—	Replace the thermal head.
Missing dots in specific section	Faulty connection of printer mechanism	Check whether or not the printer mechanism cable is connected properly.	Connect the printer mechanism cable properly.
	Faulty thermal head	—	Replace the thermal head.

Phenomenon	Cause	Check Method	Repair Method
Low print quality	Faulty printing paper	Check whether or not the specified printing paper is used.	Replace with the recommended paper or its equivalent.
Too much ink blot	Faulty battery pack	Check whether or not the specified battery pack is used.	Use the specified battery pack.
	Foreign substance adhered to the thermal head or platen roller	Check the thermal head and platen roller for any adhered foreign substance.	Dip a cotton swab or soft cloth in ethyl alcohol and wipe off the foreign substance.
Blurred characters	Faulty printing paper	Check whether or not the specified printing paper is used.	Replace with the recommended paper or its equivalent.
	Worn platen roller	The platen roller is worn out and slips easily.	Replace the platen roller unit.

* If the printer continues to print for a long time, the printed characters become thicker. If printing is suspended and restarted, print concentration will change slightly. Print density becomes lower if used at a low temperature.

*** Paper Feed Failure**

Phenomenon	Cause	Check Method	Repair Method
A printing paper feed motor does not work or malfunctions.	Faulty connection of motor connector	Check the motor connector for its connection.	Connect the connector properly.
	Faulty battery pack	Check whether or not the specified battery pack is used.	Use the specified battery pack.
	Faulty motor body	Use a tester or oscilloscope to measure a supply voltage and waveform.	If the supply voltage and waveform are normal, replace the motor (printer mechanism).
The printing paper is not fed or fed unproperly.	Faulty paper feed	Check whether or not the printing paper is jamming or torn and caught in a paper path.	Remove unnecessary printing paper and set properly.
	Foreign substance in the gear	Check the motor gear for any foreign substance.	Remove the foreign substance.
	Broken gear	Check whether or not the motor gear is broken.	Replace the motor (printer mechanism).
	Faulty motor body	Use a tester or oscilloscope to measure a supply voltage and waveform.	If the supply voltage and waveform are normal, replace the motor (printer mechanism).

*** PE Sensor Failure**

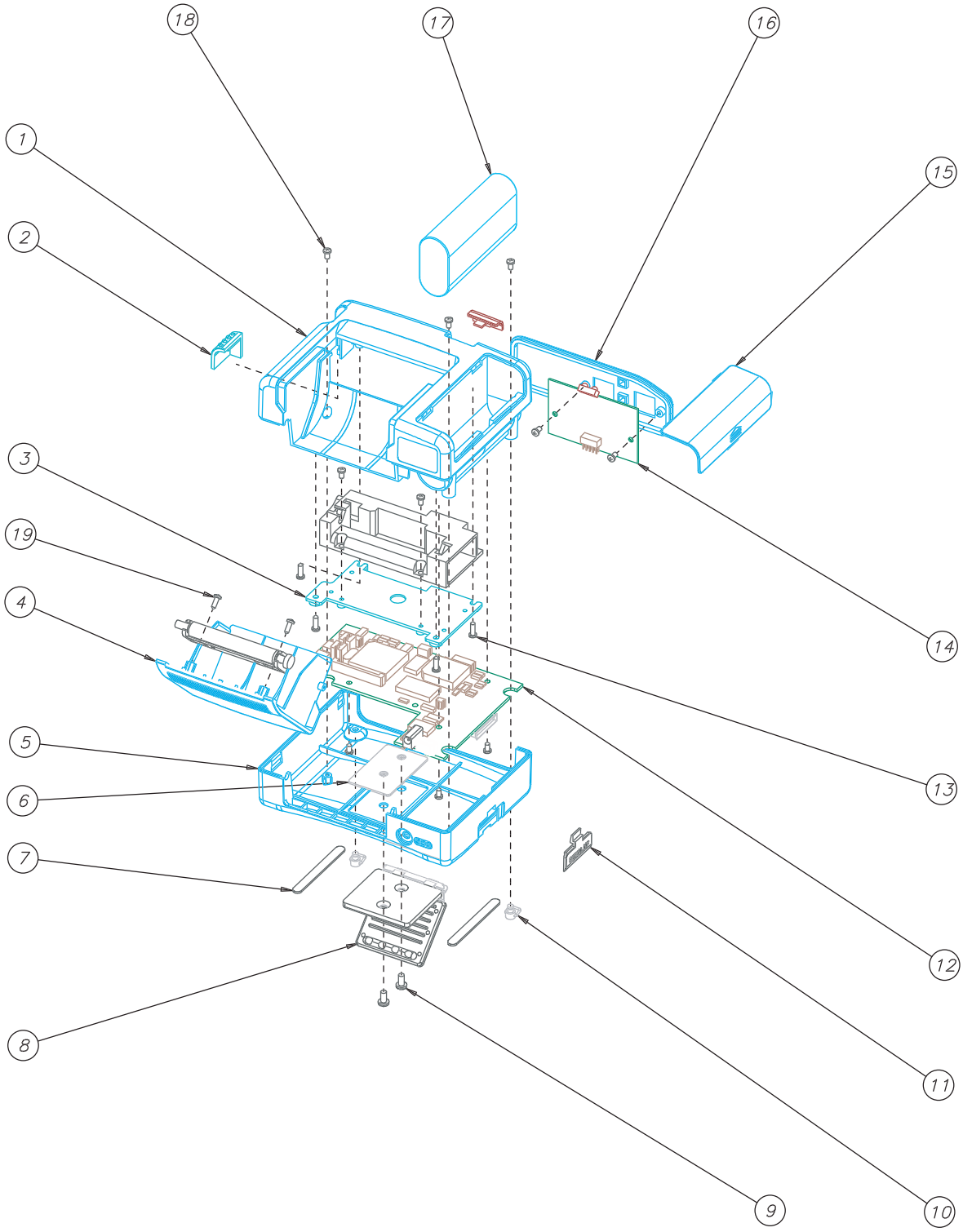
Phenomenon	Cause	Check Method	Repair Method
PE is always detected.	Faulty sensor	Use a tester to check whether or not a supply voltage and signal are normal.	Replace the PE sensor.
PE is not detected.	Faulty sensor	—	Replace the PE sensor.
	Foreign substance caught by the sensor	Check for any foreign substance.	Remove the foreign substance.
	Sensor exposed to the direct sunshine or strong light	Check operation, avoiding the direct sunshine or strong light.	Use in a place free from the direct sunshine or strong light.

* If PE is not detected with no printing paper set, the printer will print even if the paper is not set, causing a trouble to the printer head, etc. If printing is performed in this condition, replace the platen roller and head.

*** Others (Operational Failure Included)**

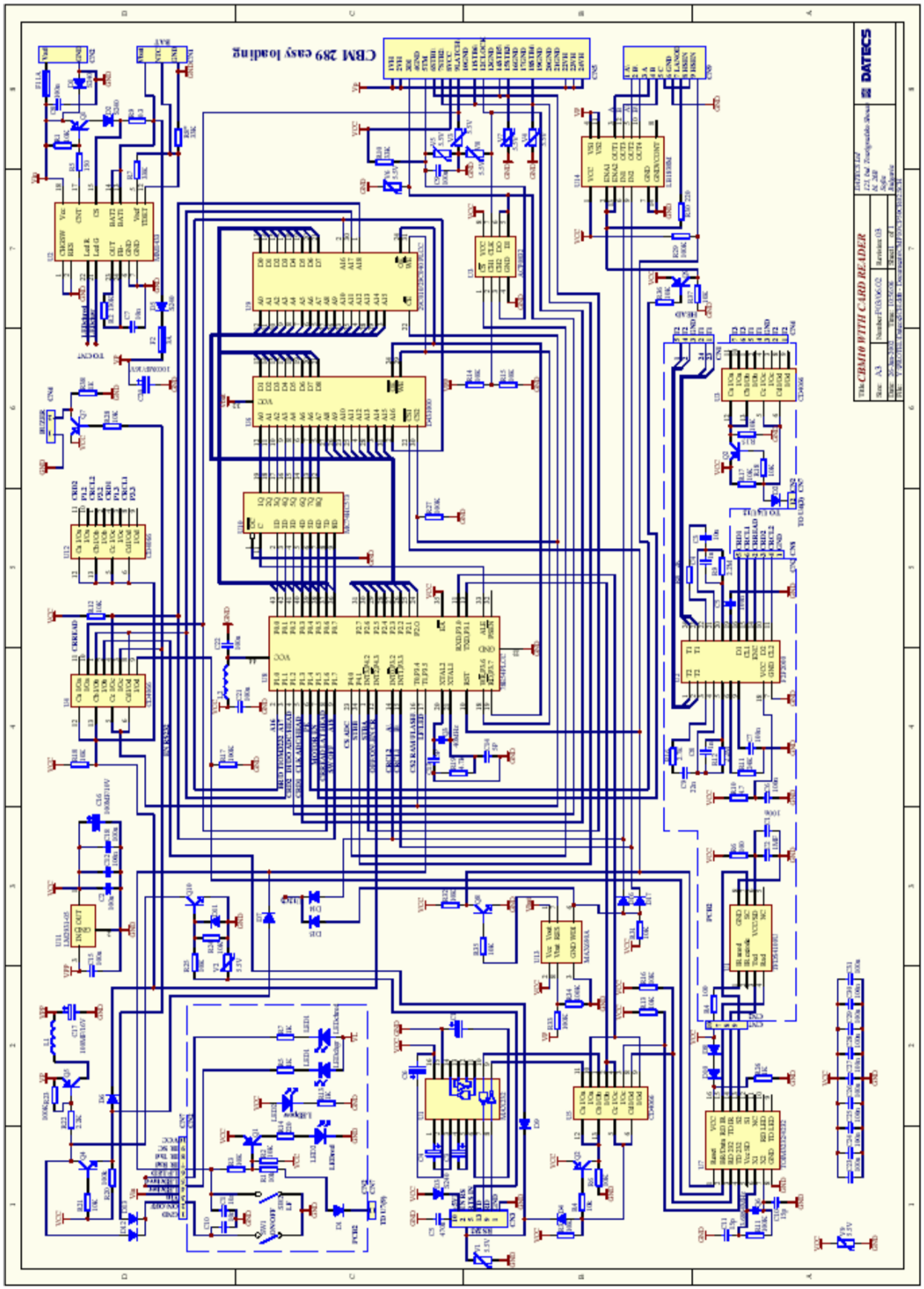
Phenomenon	Cause	Check Method	Repair Method
At power-on, the CHARGE and ON lamps remain illuminated.	Faulty control board	—	Replace the control board.
At power-on, the ERROR lamp blinks.	Faulty memory	—	Replace the memory or control board.
Kanji is not printed.	No Kanji ROM	Check whether or not the printer is for overseas use.	Replace the control board with one for domestic use or attach the Kanji ROM.
	Faulty Kanji ROM	—	Replace the Kanji ROM.
Erroneous printing or malfunctioning.	The printer is used in a noisy place	Check whether or not there is any noise emitting object around the printer.	Change the place.
A printer body or internal temperature is high.	Bad working environment	Check the working environment and installation site.	Move the printer to a well-ventilated place within the specified temperature range.

5. ASSEMBLY DRAWING

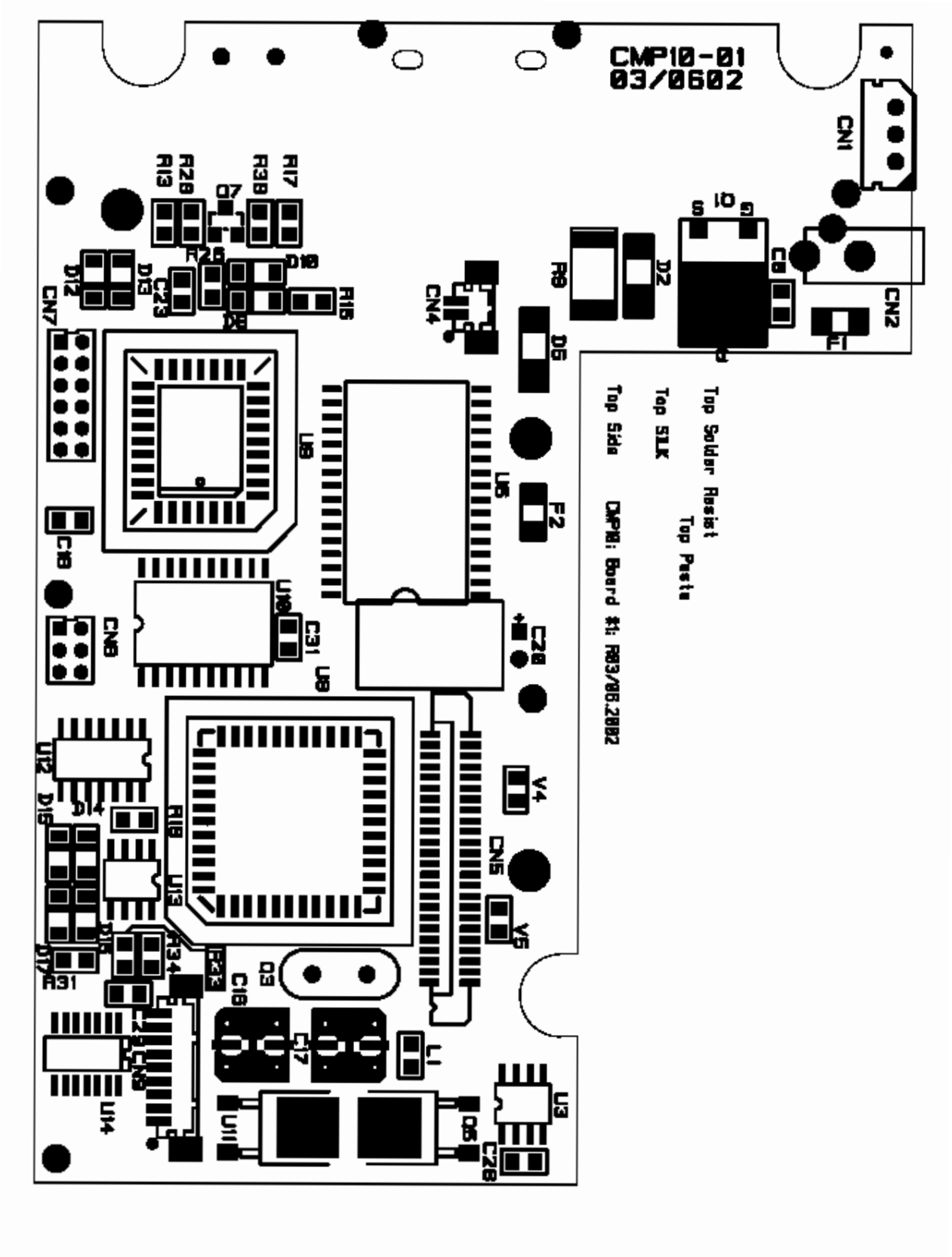


POS	Name	Quantity
1	Cover Front	1
2	Button	1
3	Printer base	1
4	Paper cover 40 mm	1
5	Cover back	1
6	Lamella	1
7	Rubber foot	2
8	Belt clip	1
9	Screw M3 × 6	2
10	Strap hook	2
11	RS connector cover	1
12	Main PCB	1
13	Screw M2.5 × 8	4
14	OP Panel PCb	1
15	Battery cover	1
16	OP Panel	1
17	LiION Battery	1
18	Screw M2.5 × 6	10
19	Screw M2 × 6.5	2

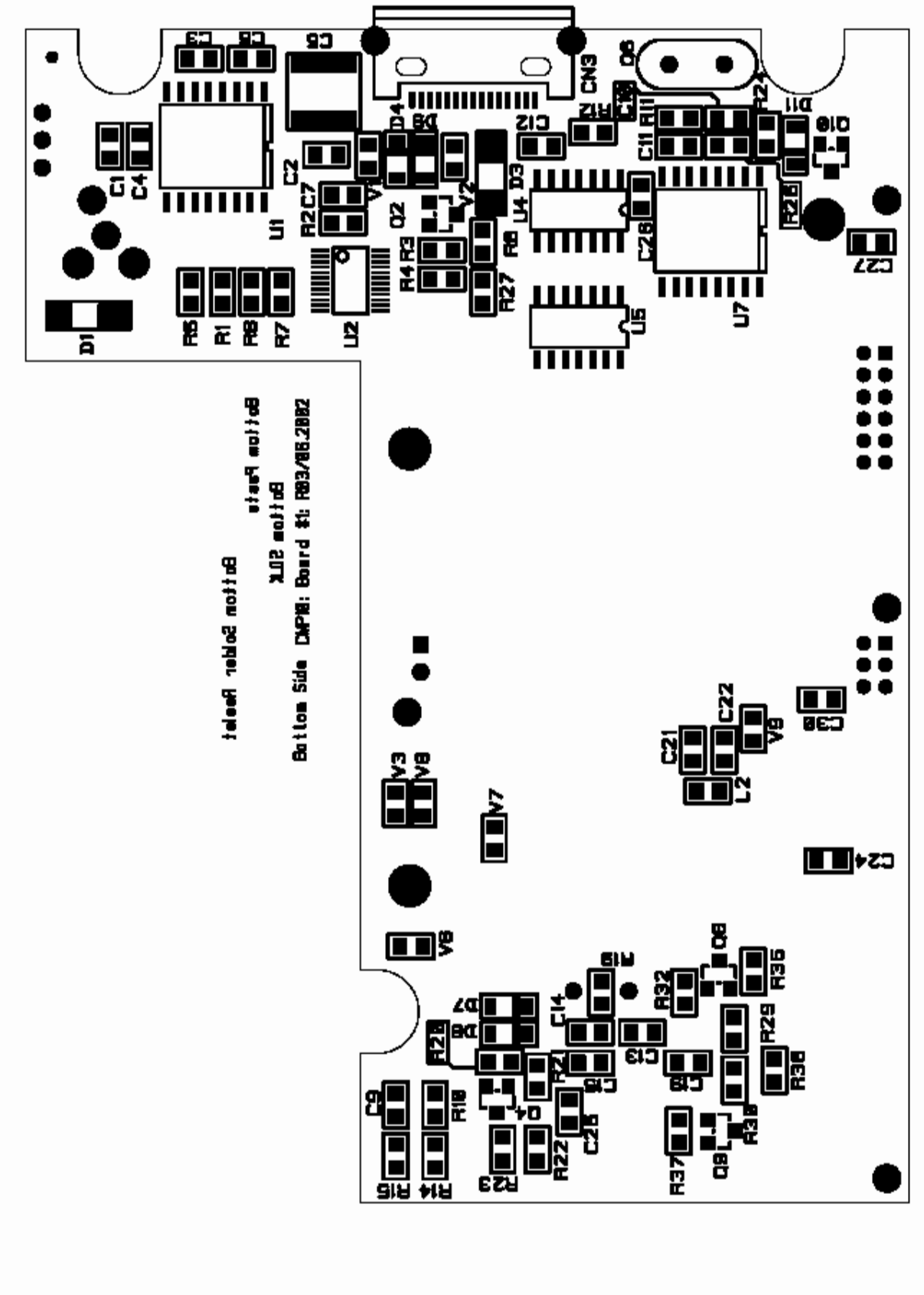
6. ELECTRICAL DIAGRAM OF MAIN PCB



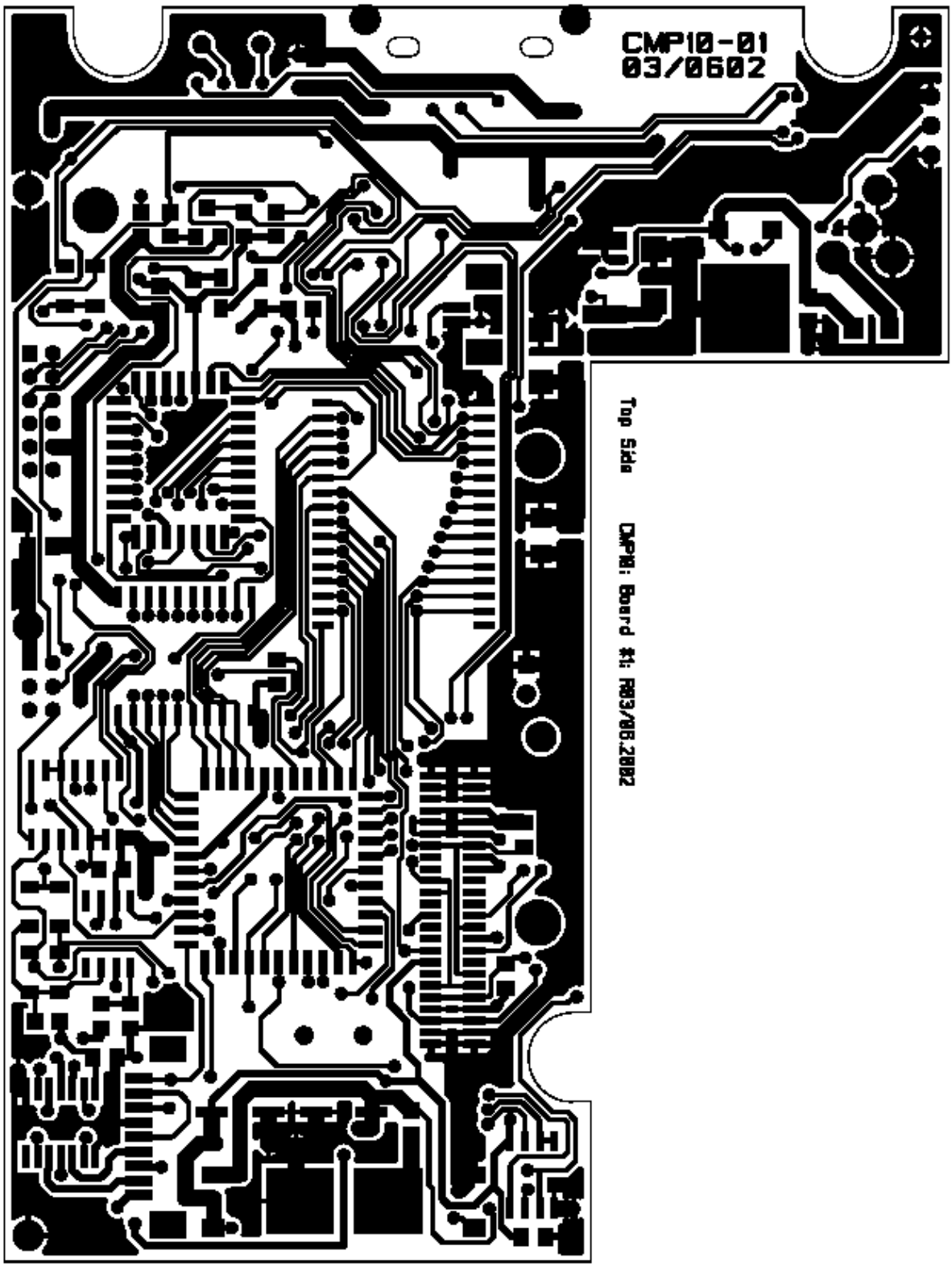
6.1 CMP-10 MAIN PCB - Top Side



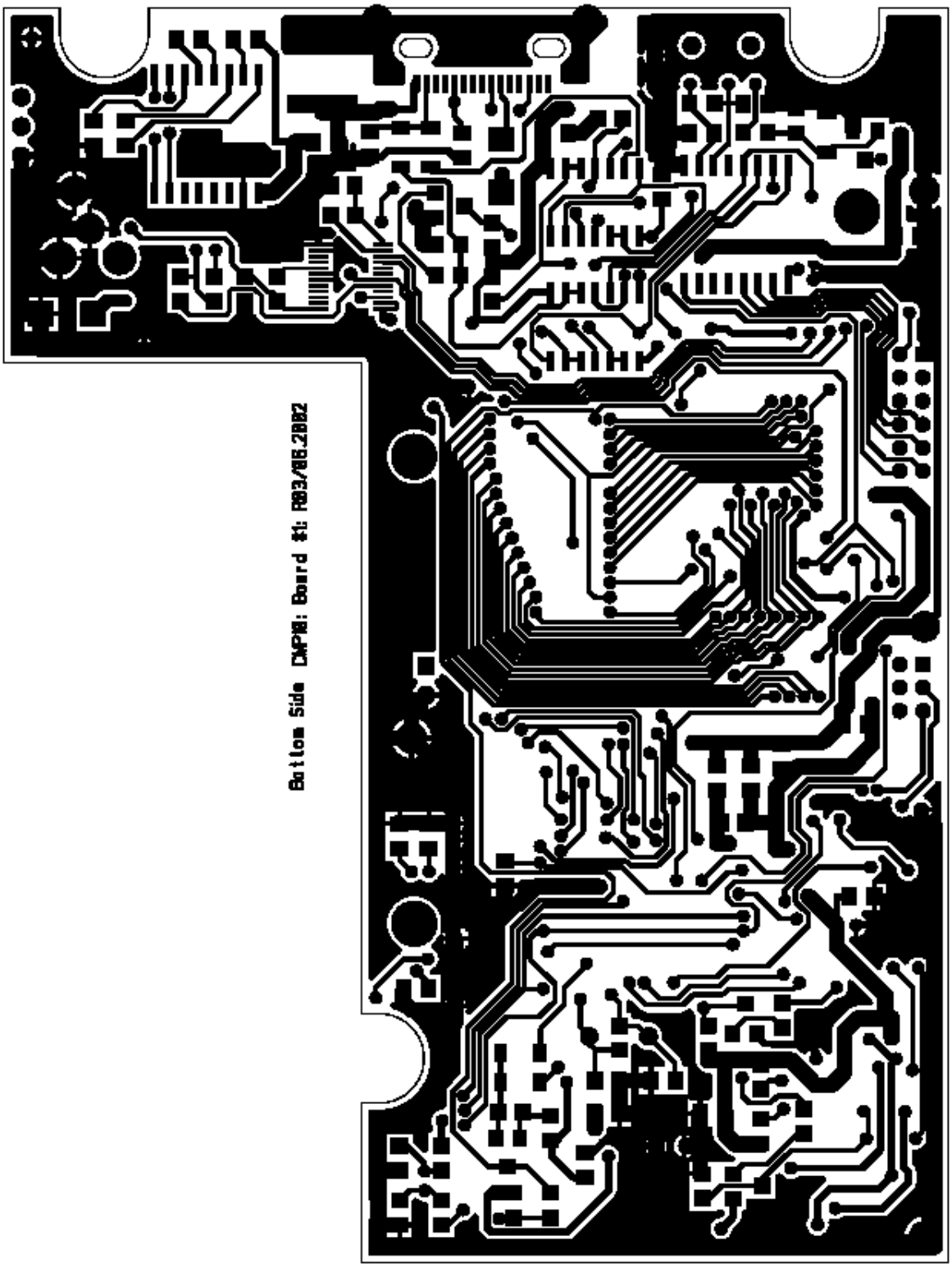
6.2 CMP-10 MAIN PCB - Bottom Side



6.3 CMP-10 MAIN PCB - Top Side



6.4 CMP-10 MAIN PCB - Bottom Side



7. MAIN PCB - PARTS LIST

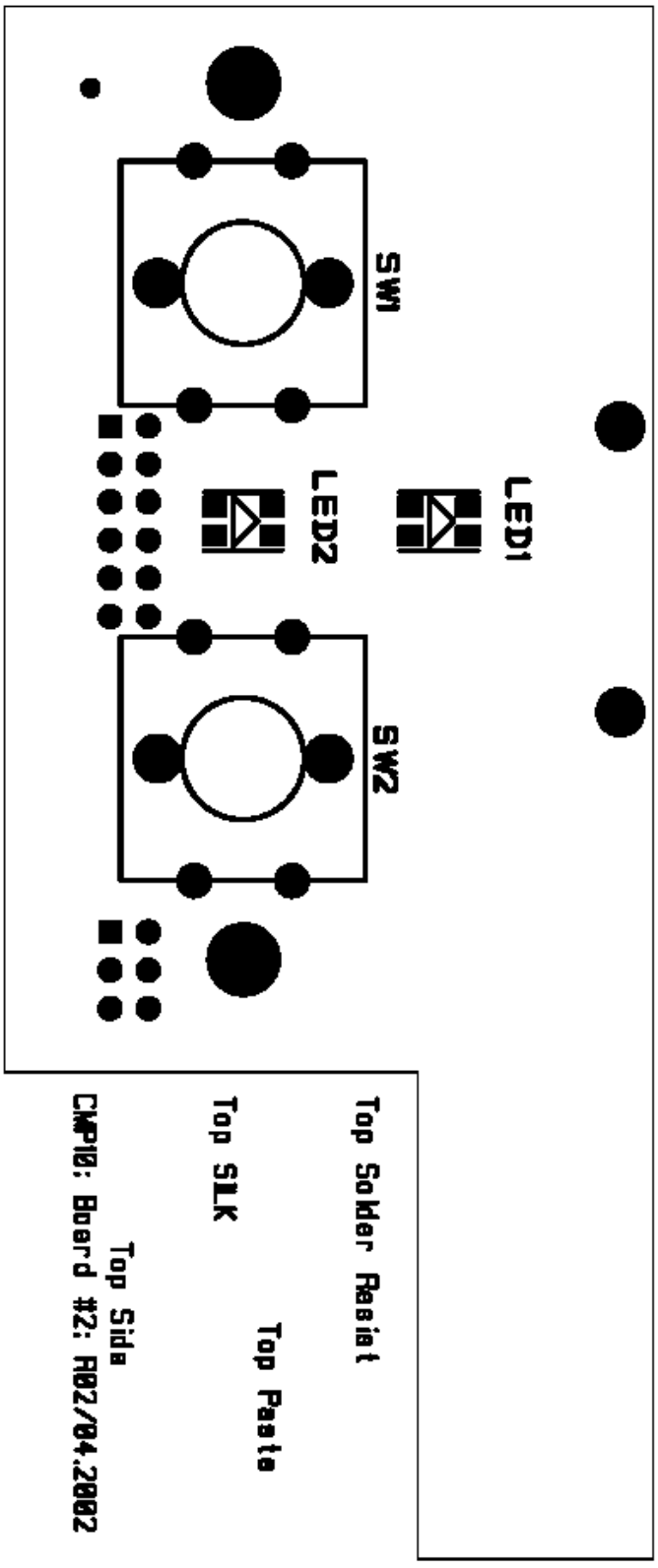
No.	Name	Part Number	Manufacturer
U1	Interface IC	SP232ECT	SIPEX
U2	Battery charging IC	MM1433BV	MITSUMI
U3	A/D Converter	TLC0832	TI
U4	CMOS IC	CD4066	FAIRCHILD
U5	CMOS IC	CD4066	FAIRCHILD
U6	1 Mbit SRAM	K6T1008C2E-GB70 /5V	SAMSUNG
U7	IrDA Controller	TOIM4232	VISHAY
U8	CPU	W78E516B PLCC	WINBOND
U9	Flash ROM	W29EE011P-90 PLCC	WINBOND
	Flash ROM	M29C400	ST
U10	8 BIT LATCH	74HCT573CDR	TI TI, PHLPS,
U11	Voltage Regulator	LM2931ADT50	ON SEMI, NS
U12	CMOS IC	CD4066	FAIRCHILD
U13	Reset IC	SP690ACN (SMD)	SIPEX
		MAX690ACS	MAXIM
		SP703ACN	SIPEX
U14	Motor controller IC	LB1838M	SANYO
Q1	FET Transistor	IRFR9014 D-Pak	IR
Q2	PNP Transistor	KTA1504	KEC
		2SA1162-GR	TOSHIBA
Q3	X'TAL	40 MHz/HC49S	SUNNY
Q4	NPN Transistor	KTC3875	KEC
		2SC2712-GR	TOSHIBA
Q5	Transistor	KTA1715	KEC
		2SA715	HITACHI
Q6	X'TAL	3.6864 MHz/HC49S	SUNNY
Q7	PNP Transistor	KTA1504	KEC
		2SA1162-GR	TOSHIBA
Q8	NPN Transistor	KTC3875	KEC
		2SC2712-GR	TOSHIBA
Q9	PNP Transistor	KTA1504	KEC
		2SA1162-GR	TOSHIBA
Q10	NPN Transistor	KTC3875	KEC
		2SC2712-GR	TOSHIBA

No.	Name	Part Number	Manufacturer
D1	Fast Recovery Diode	SR240	DAESAN
D2	Fast Recovery Diode	SR240	DAESAN
D3	Fast Recovery Diode	SR240	DAESAN
D4	Diode	LL4148	DAESAN
D5	Fast Recovery Diode	SR240	DAESAN
D6	Diode	LL4148	DAESAN
D7	Diode	LL4148	DAESAN
D8	Diode	LL4148	DAESAN
D9	Diode	LL4148	DAESAN
D10	Diode	LL4148	DAESAN
D11	Diode	LL4148	DAESAN
D12	Diode	LL4148	DAESAN
D13	Diode	LL4148	DAESAN
D14	Diode	LL4148	DAESAN
D15	Diode	LL4148	DAESAN
D16	Diode	LL4148	DAESAN
D17	Diode	LL4148	DAESAN
C1	Chip capacitor	1 μF/16 V	WALSIN
C2	Ceramic capacitor	100 nF/50 v	WALSIN
C3	Chip capacitor	1 μF/16 V	WALSIN
C4	Chip capacitor	1 μF/16 V	WALSIN
C5	Chip capacitor	GRM	MURATA
C6	Chip capacitor	1 μF/16 V	WALSIN
C7	Chip capacitor	10 nF/50 V	WALSIN
C8	Chip capacitor	100 nF/50 v	WALSIN
C9	Chip capacitor	100 nF/50 v	WALSIN
C10	Chip capacitor	15 pF/50 V	WALSIN
C11	Chip capacitor	15 pF/50 V	WALSIN
C12	Chip capacitor	100 nF/50 v	WALSIN
C13	Chip capacitor	5 pF/50 V	WALSIN
C14	Chip capacitor	5 pF/50 V	WALSIN
C15	Chip capacitor	100 nF/50 v	WALSIN
C16	Electrolytic capacitor	100 μF/10 V	SAMWHA
C17	Electrolytic capacitor	100 μF/10 V	SAMWHA
C18	Chip capacitor	100 nF/50 v	WALSIN
C19	Chip capacitor	100 nF/50 v	WALSIN
C20	Electrolytic capacitor	1000 μF/10 V	WALSIN
C21	Chip capacitor	100 nF/50 V	WALSIN
C22	Chip capacitor	100 nF/50 V	WALSIN
C23	Chip capacitor	100 nF/50 V	WALSIN
C24	Chip capacitor	100 nF/50 V	WALSIN
C25	Chip capacitor	100 nF/50 V	WALSIN
C26	Chip capacitor	100 nF/50 V	WALSIN
C27	Chip capacitor	100 nF/50 V	WALSIN
C28	Chip capacitor	100 nF/50 V	WALSIN

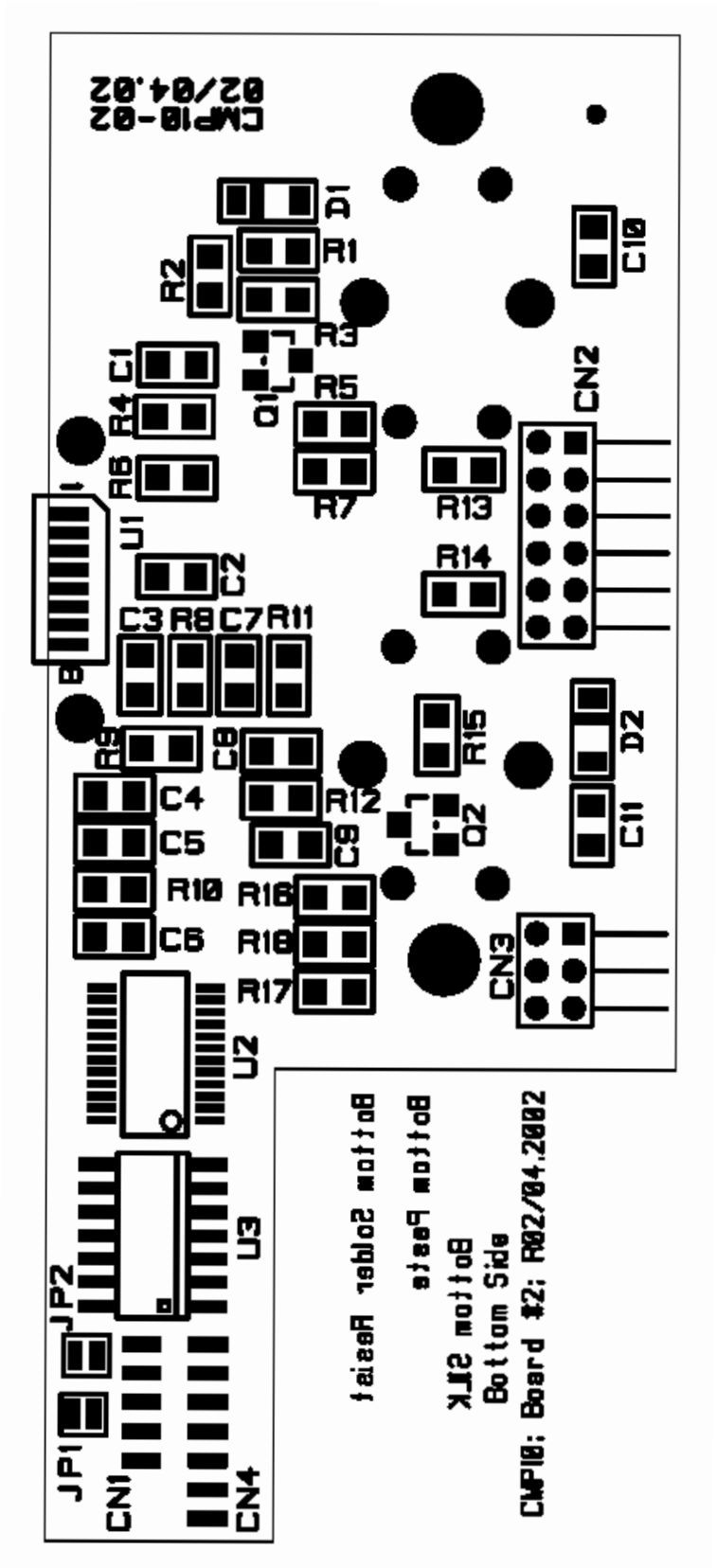
No.	Name	Part Number	Manufacturer
C29	Chip capacitor	100 nF/50 V	WALSIN
C30	Chip capacitor	100 nF/50 V	WALSIN
C31	Chip capacitor	100 nF/50 V	WALSIN
R1	Chip Resistor 0805 5%	10 K	YAGEO
R2	Chip Resistor 0805/5%	130 K	YAGEO
R3	Chip Resistor 0805/5%	10 K	YAGEO
R4	Chip Resistor 0805/5%	10 K	YAGEO
R5	Chip Resistor 0805/5%	150 Ohm	YAGEO
R6	Chip Resistor 0805/5%	10 K	YAGEO
R7	Chip Resistor 0805/5%	33 K	YAGEO
R8	Chip Resistor 0805/5%	33 K	YAGEO
R9	Carbon Resistor	0.3 Ohm/1 W/5%	YAGEO
R10	Chip Resistor 0805/5%	33 K	YAGEO
R11	Chip Resistor 0805/5%	100 K	YAGEO
R12-R16	Chip Resistor 0805/5%	10 K	YAGEO
R17	Chip Resistor 0805/5%	100 K	YAGEO
R18	Chip Resistor 0805/5%	10 K	YAGEO
R19	Chip Resistor 0805/5%	4.7 K	YAGEO
R20	Chip Resistor 0805/5%	100 K	YAGEO
R21	Chip Resistor 0805/5%	10 K	YAGEO
R22	Chip Resistor 0805/5%	2.2 K	YAGEO
R23	Chip Resistor 0805/5%	100 K	YAGEO
R24	Chip Resistor 0805/5%	10 K	YAGEO
R25	Chip Resistor 0805/5%	10 K	YAGEO
R26	Chip Resistor 0805/5%	1 K	YAGEO
R27	Chip Resistor 0805/5%	100 K	YAGEO
R28	Chip Resistor 0805/5%	10 K	YAGEO
R29	Chip Resistor 0805/5%	100 K	YAGEO
R30	Chip Resistor 0805/5%	220 Ohm	YAGEO
R31	Chip Resistor 0805/5%	10 K	YAGEO
R32	Chip Resistor 0805/5%	10 K	YAGEO
R33	Chip Resistor 0805/5%	100 K	YAGEO
R34	Chip Resistor 0805/5%	100 K	YAGEO
R35	Chip Resistor 0805/5%	10 K	YAGEO
R36	Chip Resistor 0805/5%	10 K	YAGEO
R37	Chip Resistor 0805/5%	10 K	YAGEO
R38	Chip Resistor 0805/5%	1 K	YAGEO
V1	Multilayer Varistor		WALSIN
V2	Multilayer Varistor		WALSIN
V3	Multilayer Varistor		WALSIN
V4	Multilayer Varistor		WALSIN
V5	Multilayer Varistor		WALSIN
V6	Multilayer Varistor		WALSIN
V7	Multilayer Varistor		WALSIN
V8	Multilayer Varistor		WALSIN

No.	Name	Part Number	Manufacturer
V9	Multilayer Varistor		WALSIN
F1	Fuse F-1206(1A)	(1 A)	BEL FUSE
F2	Fuse F-1206(3.5A/20V~)	(2.5 A/20 V~)	BEL FUSE
L1	Ferite bead 2012 0,1uH	25 MHZ/~50 OHM, 100 MHz/~75 Ohm	SAMWHA
CN1	3 Pin Connector	Molex 5267-03	MOLEX
CN2	Power jack		
CN3	STAR TAC Connector	6008	
CN4	2 Pin Connector	Molex 53398-02	MOLEX
CN5	24 Pin FPC Connector	Molex 52610-24	MOLEX
CN7	12 PIN connector	Molex 79107-12	MOLEX
CN8	6 Pin Connector	Molex 79107-06	MOLEX
CN9	9 Pin Connector	Molex 53398-09	MOLEX
PCB	PCB MAIN	CMP-10 V2.0	JND

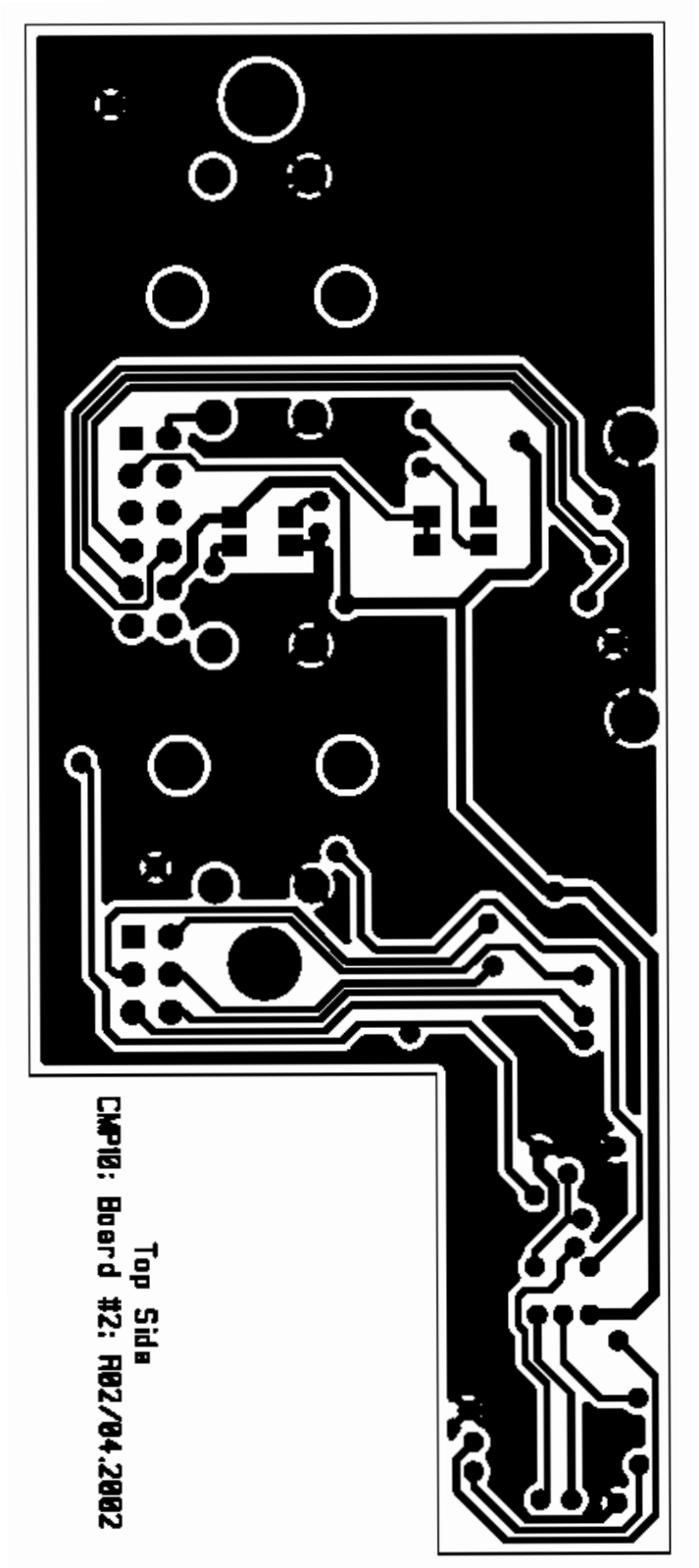
8. PANEL PCB - Top View



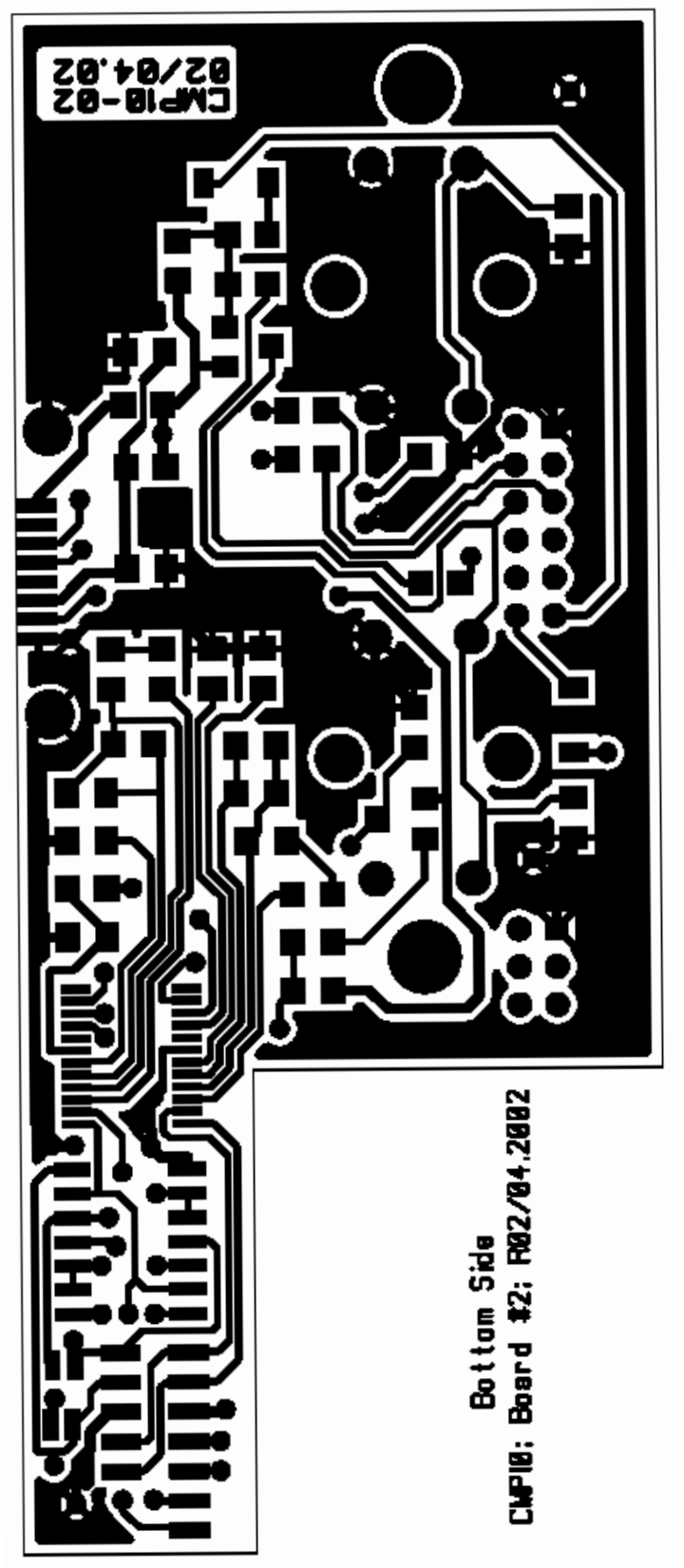
8.1 PANEL PCB ASS'Y - Bottom View



8.2 PANEL PCB ASS'Y - Top View



8.3 PANEL PCB ASS'Y - Bottom View



9. PANEL PCB - PARTS LIST

No.	Name	Part Number	Manufacturer
U1	INFRARED TRANCEIVER	TFDU4100	VISHAY
U2	F2F2000	F2F2000	ZEPETRONIC
U3	Analog switch IC	CD4066	FAIRCHILD
Q1	NPN Transistor	2SA1162-GR	TOSHIBA
		KTA1504	KEC
Q2	NPN Transistor	2SA1162-GR	TOSHIBA
		KTA1504	KEC
D1	Diode	LL4148	DAESAN
D2	Diode	LL4148	DAESAN
LED1	Bicolor LED	TBD	
LED2	Bicolor LED	TBD	
R1	Chip Resistor 0805	10 k/5%	YAGEO
R2	Chip Resistor 0805	10 k/5%	YAGEO
R3	Chip Resistor 0805	10 k/5%	YAGEO
R4	Chip Resistor 0805	100 Ohm/5%	YAGEO
R5	Chip Resistor 0805	1 k/5%	YAGEO
R6	Chip Resistor 0805	100 Ohm/5%	YAGEO
R7	Chip Resistor 0805	1 k/5%	YAGEO
R8	Chip Resistor 0805	2 k/5%	YAGEO
R9	Chip Resistor 0805	2,2 M/5%	YAGEO
R10	Chip Resistor 0805	4.7 k/5%	YAGEO
R11	Chip Resistor 0805	24 k/5%	YAGEO
R12	Chip Resistor 0805	2.2 M/5%	YAGEO
R13	Chip Resistor 0805	1 k/5%	YAGEO
R14	Chip Resistor 0805	220 Ohm/5%	YAGEO
R15	Chip Resistor 0805	10 k/5%	YAGEO
R16	Chip Resistor 0805	2.7 k/5%	YAGEO
R17	Chip Resistor 0805	10 k/5%	YAGEO
R18	Chip Resistor 0805	10 k/5%	YAGEO
C1	Chip Capacitor 0805	100 nF/20%	WALSIN
C2	Chip Capacitor 0805	1 µF/20%	WALSIN
C3	Chip Capacitor 0805	10 nF/20%	WALSIN
C4	Chip Capacitor 0805	1 nF/20%	WALSIN
C5	Chip Capacitor 0805	100 nF/20%	WALSIN
C6	Chip Capacitor 0805	100 nF/20%	WALSIN
C7	Chip Capacitor 0805	100 nF/20%	WALSIN
C8	Chip Capacitor 0805	1 nF/20%	WALSIN
C9	Chip Capacitor 0805	22 nF/20%	WALSIN

No.	Name	Part Number	Manufacturer
C10	Chip Capacitor 0805	10 nF/20%	WALSIN
C11	Chip Capacitor 0805	10 nF/20%	WALSIN
CN1	Magnetic head		
N2	12 pin Molex	Molex 87049-1016	MOLEX
CN3	6 pin Molex	Molex 87049-0616	MOLEX
CN4	MAGNETIC HEAD		
SW1	TACT SWITCH	SKHCAD301A	ALPS ELECTRIC
SW2	TACT SWITCH	SKHCAD301A	ALPS ELECTRIC
PCB	PANEL PCB	CMP-10 V2.0	JND

BATTERY SPECIFICATION

1. Scope

This Product Specification ('Specification' hereinafter) covers the requirements for the rechargeable lithium-ion battery Pack manufactured and supplied by Samsung SDI Co., Ltd. to **Japan CBM Corporation** for its product "**2S¡¿1P Soft Pack**". The battery pack contains lithiumion battery, safety device, a protection circuit module.

2. Description and Model

2.1	Description	Rechargeable Lithium-ion battery pack
2.2	Battery	ICR18650-20
2.3	Battery Pack Model	P21R04-03-S01

3. Ratings

3.1	Nominal Capacity 2000 mAh (0.2 C Discharge)	
3.2	Nominal Voltage	7.4 V
3.3	End Voltage	5.5 V
3.4	Charging Method	CC-CV

(Constant-Voltage with Limited current)

3.5	Charging Voltage	8.4 V
3.6	Charging Current	
	Standard charge	1000 mA/3 Hr
	Rapid charge	2000 mA/2.5 Hr
3.7	Max. Charge current	2000 mA
3.8	Max. Discharge current	2000 mA
3.9	Internal Resistance	< 280 m Ohm
3.10	Weight	About 90.0 g
3.11	Operating Temperature	
	Standard charge	0 to 45ºC
	Standard discharge	–20 to 60ºC
3.12	Storage Temperature	
	–20 ~ 20ºC	< 1 Year
	–20 ~ 45ºC	< 3 Months
	–20 ~ 60ºC	< 1 Month
3.13	Storage Humidity	20 ~ 85 % RH (not condensed)

4. Outline Dimension

Refer to attached drawing.

5. Appearance

Any critical cosmetic damage must not be found from the appearance of the products.

6. Standard Test Condition

6.1 Test Sample Condition

The battery pack used for the test shall be new and delivered no more than one month before.

6.2 Environmental Condition

Unless otherwise specified, all tests stated in this specification are conducted at temperature 25 ±5ºC and humidity 65 ±20% and charged state.

6.3 Test Equipment Condition

The grade of voltmeter and ammeter used in the test shall be higher than class 0.5, a high impedance type.

7. Characteristics

7.1 Standard Charge

"Standard charge" means charging the battery pack with a charge current.

1000 mA with constant voltage of 8.4 V with 3.0Hr cutoff

7.2 Initial Capacity

"Initial capacity" is defined as the initial discharge capacity of the battery pack, which is measured with discharge current of 400 mA with 5.5 V cutoff within 1 hour after the standard charge.

The Initial Discharge Capacity shall be more than 95%.

7.3 Cycle Life

Cycle life is defined by the discharge capacity after 300 Cycles.

Each cycle has a period of

charge with initial current 2000 mA to 8.4 V
rest Capacity 10 minutes
discharge with 2000 mA with 5.5 V cutoff
rest Capacity 30 minutes

Discharge Capacity after 300 cycles > 80% (Initial Capacity).

7.4 Initial Internal Impedance

This means AC impedance of the battery pack measured at 1 kHz after standard charge.

Initial internal impedance < 280 m Ohm

7.5 Discharge Capacity with Temperature

This means relative value of discharge capacity at various temperature compared with the discharge capacity at 25 ±5ºC (100%)

Conditions are:

Standard charge

Discharge current 400mA with 5.5V cutoff

Relative Discharge Capacity	80%	100%	95%
at	0ºC	25ºC	40ºC

7.6 Storage Characteristics

Remaining capacity of the battery pack which was stored at 25 ±5ºC for 30 days is measured by discharge capacity.

Conditions are :

Standard charge before storage

Discharge current 400 mA with 5.5 V cutoff

Remaining Capacity (after the storage) >80%.

8. Function of Protection Circuit Module (hereinafter PCM)

8.1 Overcharge Protection

4.35 ±0.025 V/cell

8.2 Overdischarge Protection

2.30 ±0.080 V/cell

8.3 Overcurrent Protection

2 ~ 6.5 A (Ave. 4.25 A) depending upon pack voltage, with reset when load is removed or pack is recharged.

8.4 Power Dissipation

Run:	15 µA
Shut down:	0.1 µA

9. Safety Test

9.1 Overcharge Test

Test method:

Apply charge voltage 12 V with current 1.0 C to the battery pack.

Criteria:

PCM shall operate and stop charging. Capacity > 87%
No damage such as leakage, flame, fire was allowed.

9.2 External Short Circuit Test

Test method:

Short-circuit the battery pack with 8.4 V charged, by connecting positive and negative terminals of the battery pack with a resistor less than 100 m Ohm 20 times every second.

Criteria:

PCM shall operate and stop discharging. OCV > 7.2V
No damage such as leakage, flame, fire was allowed.

9.3 Overdischarge Test

Test method:

Discharge the battery pack with current 1.0 C for 12 hours.

Criteria:

PCM shall operate and stop discharging. Capacity > 87%
No damage such as leakage, flame, fire was allowed.

10. Mechanical Characteristics

10.1 Vibration Test

Test method:

This means the endurance of the battery pack against vibration.

Frequency and amplitude:

10 Hz → 55 Hz → 10 Hz / 0.8 mm

Sweep speed :

1 ±0.055 Hz/min

Criteria:

No leakage , OCV > 7.2V, Internal impedance < 320 m Ohm

11. Shipment

The battery pack shall be shipped in a 40~60% charged state.

12. Caution and Prohibition

Before using and handling the battery pack, see carefully attached
"**Handling Instruction for Lithium Ion Rechargeable Battery Pack**".

13. Others

13.1 Storage for a Long Term

If the battery pack is kept for a long term (3 months or more), it is strongly recommended that the battery pack be preserved at dry and low temperature atmosphere.

Handling Instruction for Lithium Ion Rechargeable Battery Pack

SAFETY INSTRUCTIONS

Please follow the warnings and precautions listed below to avoid possible hazards from the improper use of batteries and to ensure correct and safe use of them. The following notes should be put in an appropriate and effective location in each end-use product and its instruction manual.

Warning

1. Do not short-circuit the battery, as it may generate heat.

   To avoid short-circuiting, do not let the battery come in contact with metal objects at any time, especially when transporting.
2. Do not put the battery into a fire, as it may swell or explode. Do not use near any type of heat source. When battery leaks electrolyte or emit a strange smell, discontinue use and move battery away from the heat source.
3. Cover terminals with insulating tape before proper disposal.
4. Do not solder the battery directly. Heat applied during soldering may damage the safety vent in the battery's positive cover.
5. Do not alter or disassemble the battery. Do not take off the battery's cover or jacket.
6. Do not deform the battery by applying pressure. Do not throw, hit or drop the battery. Do not subject the battery to mechanical shocks.
7. Do not submerge the battery in water, or any type of liquid.

   Do not expose the battery to any type of water, such as rain or moisture, as it might heat, corrode, or not function occasionally.
8. Do not connect the battery reversed in positive (+) and negative (–) terminals. Do not charge the battery with polarities reversed, as it may swell or explode.
9. Do not use any chargers not specified by manufacturer .

   Do not charge the battery under conditions not specified, as it may leak electrolyte, heat or explode.
10. Do not use the battery with other makers' batteries, different types and or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries. Do not use old and new Li-ion batteries together, as they might leak electrolyte, heat or explode.
11. Do not mistreat the battery, or use the battery in applications not recommended by manufacturer.
12. Do not let electrolyte come into contact with skin, eyes, or clothing. If contact with skin or eyes occurs, immediately seek help from a doctor.
13. Keep the battery out of reach of babies and children to avoid any accidents.
14. Do not put batteries in a microwave oven or pressure cooker.
15. Although rechargeable, the battery has a limited life-span. Replace when usage time between charges become short.
16. Do not store at or use in temperatures above 60ºC.
17. Do not short-circuit the cells when open the carton.
18. If there are any problems of the battery, immediately keep the battery at safe place and contact to Japan CBM Corporation.